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ABSTRACT

This study examined how teachers use instructional methods to meet the diverse academic needs of students. Surveys were completed by 284 secondary school teachers from 28 high schools in 7 school divisions of the Metropolitan Educational Research Consortium. Rural, suburban, and urban schools were represented. Qualitative and quantitative methods were used to analyze survey responses. Almost all (90%) teachers indicated that addressing academic differences was very important or exciting. Teachers recognized that different learners require various instructional methods to help them understand content. Teachers reported using a variety of methods, although methods that require proactive and planned efforts to challenge the wide range of student differences were among those least often cited. Many of the methods most frequently used required making minor adjustments to a single lesson rather than planning different lessons for students with varying levels of readiness or skill. Findings conclude that teacher responses provide insight into barriers to addressing academic differences and a starting point for future training efforts. (Contains three tables.) (SLD)

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Differentiation of Instructional Methodologies in Subject-Based Curricula at the Secondary Level

Metropolitan Educational Research Consortium

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Research Brief # 38

MERC

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Differentiation of Instructional Methodologies in Subject-Based Curricula at the Secondary Level

Recent efforts to detrack secondary schools have called attention to the need for practices that differentiate instruction to meet a wide range of student performance levels within classrooms. Research demonstrates that schools have employed a variety of organizational policies in their detracking efforts, however, policies have not guaranteed high quality instruction (Gamoran & Weinstein, 1995). The goal of quality instruction for all students is more often idealized than realized as teachers struggle to provide multiple layers of instruction.

The emerging meaning of differentiated instruction, and the one forming the basis for this research, focuses on using proactive planning to provide a variety of instructional methods to respond to student differences including: interests, abilities, readiness to learn, and levels of motivation found in inclusive, mixed-ability classrooms (Tomlinson, 1995a). Methods that focus on differentiating instruction move away from a single prescribed lesson and provide teachers with the flexibility to adjust factors such as learning objectives and pace of instruction to meet varied learning needs of students in the classroom. Multiple types of learning activities may occur simultaneously within the differentiated classroom as teachers make instructional decisions based on assessments of student readiness and progress (Tomlinson, 1995b).

Much of the literature on differentiating instruction describes research that was conducted in elementary and middle schools. Empirical studies, however, offer little understanding about how secondary school teachers use differentiated instruction to address students' academic differences. Researchers' (e.g., Stodolsky, 1993; Grossman & Stodolsky, 1994; Lou et al., 1996) descriptions of the relationships between secondary teachers' practices and the particular subjects they teach can shed light on how secondary instruction is typically delivered. Evidence suggests that subject-specific differences are important in understanding how teachers address academic differences in their classrooms. Characteristics of subject areas (e.g., beliefs that mathematics is hierarchical) and differences in academic departments influence teachers' instructional practices. In this study, data were collected from a sample of teachers in four content areas: math, science, social studies, and English.

The purpose of this study was to examine how teachers use instructional methods to meet students' diverse academic needs. The purpose of the study was brought into focus by posing the following research questions: (a) How important is addressing students' diverse academic needs to secondary school teachers? (b) Which instructional methods do secondary school teachers use to address students' academic differences? (c) Which instructional methods do secondary school teachers think are effective in addressing students' academic differences, and why do they think these methods are effective? (d) Which factors facilitate and which factors inhibit a secondary school teacher's ability to differentiate instruction?

METHODOLOGY

Sample. A stratified sample of 386 secondary school teachers was taken from 28 high schools in seven school divisions of the Metropolitan Educational Research Consortium (MERC). The schools represented urban, suburban, and rural populations. A total of 284 teachers returned completed surveys (response rate = 74%). The sample of respondents had an average of approximately 17 years of teaching experience with an average of 14 years teaching in their present subject area. Forty-eight percent of the teachers held a master's degree or above. In addition, teachers had varying levels of preparation to address academic differences. Fifty-six percent reported having taken inservice sessions within their school divisions, 45% reported having taken university courses, and 40% reported having attended workshops or conferences.

Instrumentation. The Differentiated Practices Survey was developed by representatives from the seven MERC school divisions participating in this study. The survey

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Table 1 - Means and Rank Order of Instructional Methods: Frequency of Use

Rank		Method	Mean	SD	n
1	**	Modeling	4.29	0.83	280
2	**	Lecture with question and answer	4.08	0.93	281
3	**	Variety of materials	3.96	0.93	281
4		Teacher-led discussion	3.87	0.91	281
5		Adjusting questions	3.85	1.12	277
6	**	Lecture	3.49	1.24	276
7	**	Small group-common goal	3.42	0.9	280
8		Small group-multiple goals	3.01	1.02	281
9	**	Peer tutoring	2.92	1.09	279
10	*	Student-led discussion	2.9	1.01	279
11		Compacting	2.65	1.2	273
12	**	Independent projects	2.59	0.92	280
13		Tiered assignments	2.28	1.21	274
14	**	Experiments	2.1	1.27	261
15		Learning Contracts	1.62	0.89	266

Note. Based on a scale in which 1=never, 2=rarely, 3=ocassionally, 4=frequently, 5=very frequenty.

* Significant differences ($p<.05$) by content area were found.

** Significant differences ($p<.01$) by content area were found.

was designed to elicit teachers' beliefs about effective practices for addressing academic differences, the frequency with which these practices are used, and factors that influence their use. Teachers were asked to identify their class with the greatest range of academic differences and to reflect about that class as they responded to questions that followed. Teachers were also asked to indicate the extent to which factors made it difficult and to which factors made it possible to address academic differences in their classrooms. A final section of the survey asked respondents how best to help teachers meet the diverse academic needs of students.

Data Analysis. Qualitative and quantitative methods were used to analyze the survey data. Descriptive statistics and multiple comparisons were calculated using SPSS. Qualitative data were coded by two experienced qualitative researchers to produce inductively derived categories to subsume all teachers' responses. Disagreements about deriving categories and coding responses were discussed until agreement was reached, so that all final coding was done by consensus.

FINDINGS

Almost all teachers (90%) indicated that addressing academic differences was important or very important. Teachers indicated that students in their classes exhibited a moderate to high degree of academic diversity. Teachers also provided certain characteristics of their most academically diverse class. This information provides a context for understanding teachers' responses to the remaining survey items. In short, teachers referred to standard level courses (93%) with students from more than one grade level most frequently.

Table 3 - Rank Order and Mean Effectiveness Ratings of Instructional Methods

Rank		Method	Mean	SD	n
1	*	Modeling	3.67	0.58	276
2	**	Variety of materials	3.59	0.61	270
3		Adjusting questions	3.36	0.73	262
4		Lecture with question & answer	3.32	0.71	279
5	**	Small group with common goal	3.19	0.74	277
6		Teacher-led discussion	3.11	0.71	278
7	**	Independent projects	3.02	0.8	256
8	**	Peer tutoring	2.99	0.86	262
9	*	Small group with multiple goals	2.99	0.81	268
10	**	Experiments	2.98	0.98	143
11		Tiered assignments	2.96	0.9	199
12		Curriculum compacting	2.88	0.85	269
13	**	Student-led discussions	2.75	0.85	266
14		Lecture	2.73	0.9	269
15		Learning contracts	2.43	0.94	155

Note. Effectiveness ratings were as follows 1=never, 2=rarely, 3=ocassionally, 4=frequently, 5=very frequenty.

* Significant differences ($p<.05$) by content area were found.

** Significant differences ($p<.01$) by content area were found.

teachers to evaluate a set of specific methods and thus the relative effectiveness of each could be analyzed. Table 3 shows that the most frequently cited methods rating between very effective and moderately effective were modeling, variety of materials, adjusting questions, and lecture with question and answer. The rankings of effectiveness shown in Table 3 are similar to the rankings for frequency of use in Table 1 with the exception of lecture. Lecture ranked sixth in frequency of use but fourteenth in effectiveness. In open-ended format, teachers indicated that group methods were most effective. When given the closed-ended choices, several methods have or may have group characteristics, (i.e., small group with common goals, small group with multiple goals, peer tutoring, experiments).

Differences by content area were found for 8 of the 15 methods. As might be expected, science teachers gave higher effectiveness ratings to experiments than did teachers of all other content areas. Although modeling was rated as an effective strategy by most teachers, English and math teachers gave this method higher ratings than did social studies teachers. English and science teachers gave student-led discussions higher ratings than math teachers did.

Factors That Facilitate and Inhibit Ability to Address Academic Differences. Teachers indicated that their efforts to differentiate instruction are facilitated to the greatest extent by structuring small group work, making time to tutor students, and using peer tutoring, respectively. Conversely, the factors that make it most difficult to address academic differences in their classrooms are large class size and students' behavioral problems. In addition, teachers noted the importance of administrative and parental support for their efforts. Teachers asked for more administrative support in dealing with disruptive students. Additional comments also stressed the importance of parent

Table 2 - Most Effective Methods for Addressing Academic Differences: Open-ended Responses

Methods	Percent of Methods Identified
Small group/ cooperative learning	15
Modeling	7
Question and answer	6
Group discussion	6
Individual instruction	6
Lecture	6
Peer tutoring	5
Projects	3
Hands-on activities	3
Using multiple senses and modes	3
Notes/outlines	3
Teacher-led discussion	2
Worksheets/review sheets	2
Tiered assignments	2

Note. Each teacher listed up to three methods. A total of 754 responses were listed.

Instructional Methods: Frequency of Use. Teachers were asked to indicate how often they used each of the 15 listed methods to address differing academic needs of their students. Table 1 includes a list of all methods ranked from most frequently used to least frequently used. Due to the nature of various content areas, further analyses were conducted to determine whether teachers of English, math, social studies, or science used instructional methods with varying frequency. Differences by content area were found for 9 of the 15 methods. English teachers reported using lecture and lecture with question and answer less frequently than teachers from the other content areas. English teachers also reported using independent projects and student-led discussions more often than math teachers. Social studies teachers reported using modeling and peer tutoring less frequently than teachers did from the other content areas. Experiments and variety of materials were reportedly used more frequently by science teachers than by teachers from the other content areas. Modeling was reportedly used more frequently by math teachers than by teachers from other content areas.

Instructional Methods: Effectiveness. Two types of survey items elicited information about which methods teachers thought were effective for addressing academic differences and why those methods were effective. The first item was an open-ended question that asked teachers to list the three methods that they believed were most effective in addressing students' academic differences in their classes. They were also asked to explain why each method was effective. Teachers named a wide variety of methods. The most frequently named methods are grouped into 14 categories summarized in Table 2.

Examination of the most frequently cited reasons for the effectiveness of these methods suggested three major emphases: learners helping each other, teachers providing reinforcement, and teachers providing for learning in multiple modes. These reasons give insight into the general goals teachers want to achieve to address academic differences.

The second way teachers indicated which methods they thought were effective was by their responses to a closed-choice item. This provided a systematic means for all

involvement in ways ranging from encouraging parents to insist on best efforts from their children to requesting that parents visit classes during the school day.

Suggestions for Helping Teachers Meet Differing Academic Needs. Teachers were asked to indicate what would help them better meet the needs of academically diverse students. Over half of the respondents indicated that staff development would be beneficial. Almost one-third of the teachers indicated that school-wide discussion of policies would improve their abilities to meet student needs. Approximately twenty per cent indicated that dissemination of research findings would be beneficial. A little more than one-third of the teachers provided responses in the space provided for "other" recommendations. Most prevalent were suggestions for smaller classes, more planning time, more relevant materials and resources, and more opportunities for collaboration with peers in and outside of the school and with special educators.

DISCUSSION AND IMPLICATIONS

Methods to Address Academic Differences. Teachers recognize that different learners require various instructional methods to help them understand content. They reported using a variety of methods, however, those methods such as tiered assignments, independent projects, or curriculum compacting that require proactive, planned efforts to challenge the wide ranges of student differences were among the methods least often cited. Many of the methods most frequently used, including adjusting questions, lecture with question and answer, and group discussion suggest what Tomlinson (1995a) calls micro-differentiation, in which minor adjustments are made to a single lesson rather than different lessons being planned for students with varying levels of readiness or skill. Although some teachers described practices that allowed advanced students to work on their own or avoid repeating what they had already mastered, the majority of efforts were directed at methods to remediate or ensure that students mastered the required content or met the basic instructional goals. Far fewer comments suggested that methods helped students develop deeper understanding than helped students retain content.

Many of the methods most frequently used are also those rated as most effective by teachers. These include modeling, lecture with question and answer, variety of materials, small groups with a common goal, and teacher-led discussion. Lecture was used more frequently than its effectiveness rating seems to warrant, however, teachers typically use multiple methods in each lesson, and lecture is often used in conjunction with most other methods. The beliefs that teachers must provide structure and reinforce important ideas are often accomplished efficiently through lecture and are also likely to contribute to the frequent use of lecture methods.

Differences in use and effectiveness ratings of methods by content area provide insight into how subjects are taught. While teachers need not be confined to specific methods based on traditions of their disciplines, findings suggest the importance of considering teachers' perceptions of how their content should be taught and the practices they employ when staff development training is designed.

Reasons for Effectiveness. Teachers most often indicated that a particular method was effective for addressing academic differences because it provided opportunities for students to support and learn from each other. This reason was given for methods involving group discussion, small group work, experiments, projects, or peer tutoring. Teachers noted the value of students hearing explanations given by their peers and working together to solve problems. Some teachers also noted the importance of students seeing what their peers can do and the role peer pressure can play in motivating students.

Reasons for effectiveness also focused on methods that allow the teacher to reinforce instruction. Specifically they cited reinforcing important ideas, providing feedback and remediation, and keeping students on track through structure and organization. Concern with building a strong foundation for learning suggests the emphasis on ensuring that all students meet the stated requirements. This may imply that teachers' most immediate concerns are for those students who are having academic difficulties.

Teachers also suggested that providing information in multiple modes and allowing students to use various senses was an effective way to address academic differences. They noted the importance of presenting content in different ways to reach all students. Some teachers focused on hands-on methods or learning by doing. Teachers stressed the importance of visual, auditory and kinesthetic experiences.

Factors Influencing Use of Methods. Teachers provided insight into the barriers that make addressing academic differences difficult and those that facilitate the use of such methods. Teachers highlighted the administrative difficulties associated with addressing academic differences such as class size, disruptive students, and time for planning. The teachers' beliefs in this study are consistent with other research that has reported their

awareness and concern about students' academic differences and needs, but has highlighted their frustration with their classroom environments and confusion about which practices to use to address individual differences (Gamoran & Weinstein, 1995; Tomlinson, 1995b). Studies focusing on heterogeneous grouping suggest that effective instruction in mixed-ability classes can be achieved through the use of small classes, additional resources to support individualized instruction, strong intellectual leadership, and careful selection of teachers and students (Gamoran & Weinstein, 1995). However, the findings in this study suggest that small classes, selection of students, and additional resources are not realities of today's classrooms. Differentiating instruction is not easily achieved. Whereas some teachers reported structuring classes to address multiple levels of student preparedness, others reported their frustration at using strategies they rated as marginally effective.

Training Needs. The findings of this study provide an important starting point for future training efforts. Teachers provided insight into how they can better meet student needs in heterogeneous secondary classrooms. They want and value support from administrators, parents, and colleagues to make changes. Teachers recognize their need for more training, however, the "one size fits all" workshops are no more effective for teachers of different disciplines than "one size fits all" instruction is for all students. Teachers want to collaborate to discuss specific aspects of the subjects they teach and have time to plan together as well as to share ideas with those from other disciplines. However, often workshops consist of introductory comments and exercises designed to provide an understanding of diverse academic needs that is typically intended as the foundation for further work. Teachers give low ratings to such workshops, stating that too little time and guidance are given for them to work together with their peers to synthesize the sometimes conflicting needs of students, state mandates, and best practices. Past research has suggested that teachers need training to direct and coordinate multiple activities and levels of instruction within their classrooms and help students develop independent, self-management skills. Information combined with coaching of recommended instructional methods are recommended (Tomlinson, 1995a).

Future Directions. Secondary teachers believe that instructional methods can improve academic achievement. Their beliefs about how to best meet the diverse academic needs of their students warrants more attention. Realties of schools, such as large classes, disruptive students, state mandates, and high stakes testing raise questions about how to plan and implement differentiated methods. The findings presented in this study reveal that teachers have differing views of what instruction designed to address academic differences is or can be.

Research examining the relationships between instruction and student outcomes for secondary students is needed. Research methods involving classroom observation and multiple assessments of student achievement in conjunction with interview and survey methods can inform practice when we focus on those teachers who employ differentiated practices effectively and increase student achievement. We need to learn how effective teachers plan and implement differentiated methods, and how they overcome obstacles that interfere with the use of those methods.

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